



# 2013 Energy Report City of Santa Barbara

April 10, 2014

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# 2013 Energy Report

- ◆ In 2013 the Cogeneration system at the El Estero Wastewater Treatment plant was completed. The Energy Team had been working on constructing this plant since 2010 and was excited to see it launch and produce electricity in December 2013.
- ◆ The Energy Team also completed sports lighting retrofits at the Dwight Murphy Ball Field and the Cabrillo Ball field, resulting in better lighting levels while saving energy and cost.
- ◆ A huge success for the Team this year was taking part in the Southern California Edison Direct Install Program. The City implemented numerous lighting retrofits through the program which resulted in an estimated \$30k in annual savings and required no capital investment by the City.
- ◆ Lastly, the team continued to work on the implementation of the Enterprise Energy Management Information System (to be completed in FY 14) which will allow us to gather critical data on energy usage and opportunities for savings.



# Electricity



# Electrical Supply

In Fiscal Year 2013 (July 2012 through June 2013) the City spent \$3.4 million on electricity. This amount has stayed flat from the previous year even though there were several major increases in usage within the organization as well as energy cost increases.

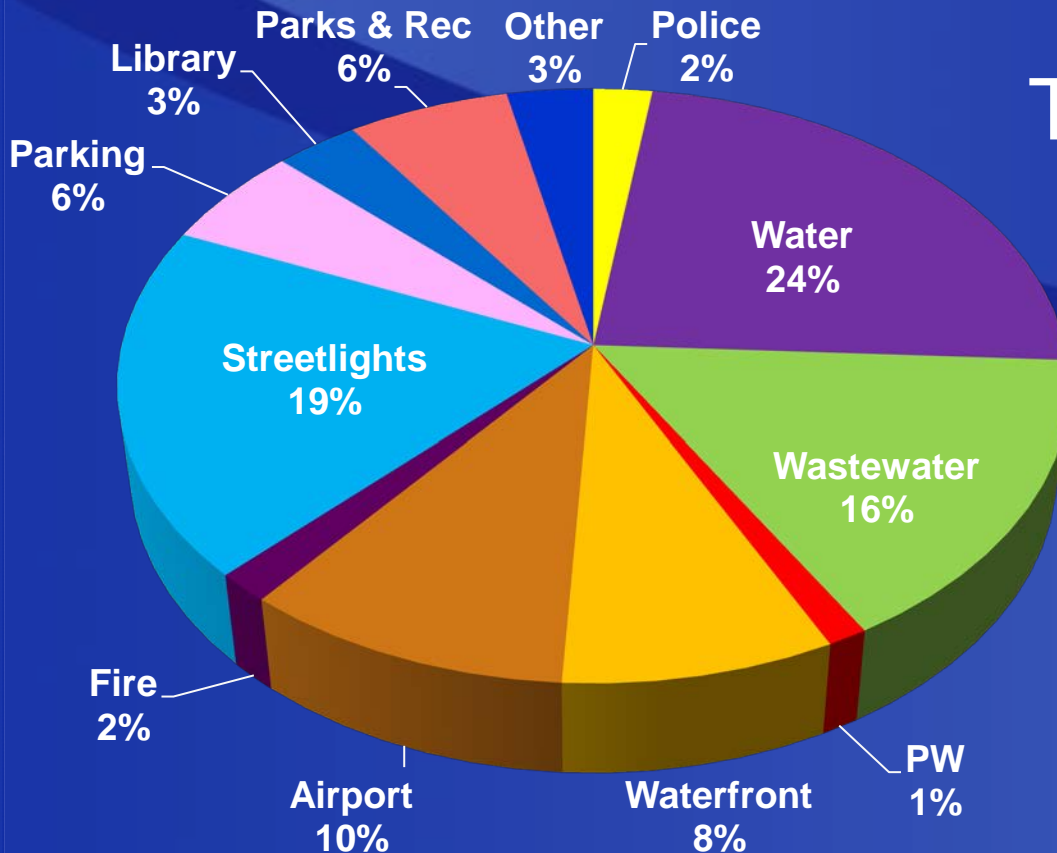
In 2013, the ozone project went online at the Cater Water Treatment Plant. This project will greatly improve the quality of our local drinking water but also significantly increases the plant's energy usage.

The following chart shows the breakdown of electrical expenses for City operations by major use area.

# FY 2013 Electricity Expense

Electricity cost by percentage of total FY 2013 expenditures for City departments or major use areas

Total \$3,413,080



# Purchased Electricity in 2013 Dollars

## City of Santa Barbara Purchased Electricity



ADJUSTED BY CPI

# Purchased Electricity

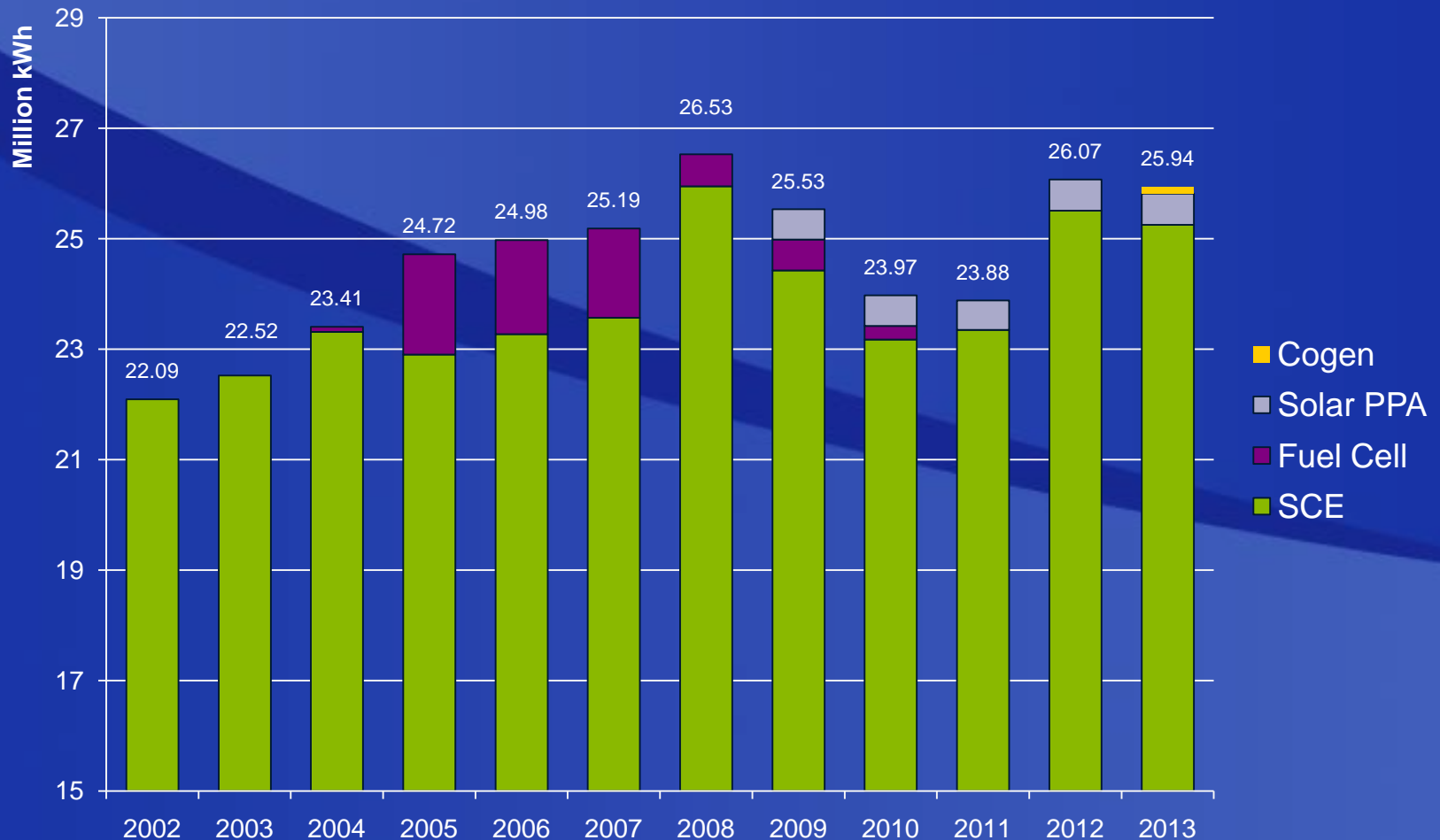
In calendar year 2013 the City purchased just under 26 Million kWh.

This amount roughly the same as CY 2012 electricity purchases (0.5% decrease).

- The following three slides outline the purchased electricity trend and the City's largest electrical users.



# Purchased Electricity





# Increased Electricity Use

Several City electricity accounts have seen significant increases this year.

The ozone project at Cater was completed in 2013 and resulted in an increased electrical usage due to additional processes involved in treating the water.

The increases experienced at La Mesa and Sheffield Pump Stations and the Los Robles Well are due a temporary shutdown of Cater for the completion of the Ozone project. During this shutdown pumps were used to move water around the City.

Additionally, the Airport opened the Historic Terminal and short term parking facilities in late 2012, to which the increase at electrical demand can be attributed.

The following graph shows the five accounts most heavily affected.

# Largest Electrical Increases Since Last Year (2013)

This slide shows facilities with the largest net electrical increases from CY 2012 to CY 2013.

SCE Account	2013 Usage	2012 Usage	% Increase
Cater	2,737,112	2,449,070	12%
La Mesa Pump Station	260,286	98,299	160%
Los Robles Well	169,638	27,595	515%
Sheffield Well	641,100	522,260	23%
Airport	1,890,036	1,779,094	6%

# Biggest Electrical Users

Water treatment and street lighting are both large electricity users, and their energy use is growing due to demand by the community.

Marina 1 is a particularly large marina by industry standards and includes two floating restrooms and the largest available slips to accommodate large vessels, which use a lot of energy. About 10% of the slips are liveaboards, contributing to the higher energy use at this meter.

The new Airport Terminal is also one of the City's largest electrical accounts due to its larger size and increased service.

# Biggest Electricity Users

This table shows the electricity use for the six largest City service accounts. It also compares the current annual total with the previous year and shows the percent change in electricity use.

SCE Account	2013 Annual kWh	2012 Annual kWh	% Change
El Estero Wastewater Treatment Plant	7,024,194	7,055,712	↓ 0.5%
Cater Water Treatment Plant	2,737,112	2,449,070	↑ 12%
Airport	1,890,036	1,779,094	↑ 6%
Marina 1	985,516	934,878	↑ 5%
Ornamental Street Lighting – Downtown	855,648	855,626	No Change
Police Department	652,901	642,143	↑ 1.5%



# Natural Gas





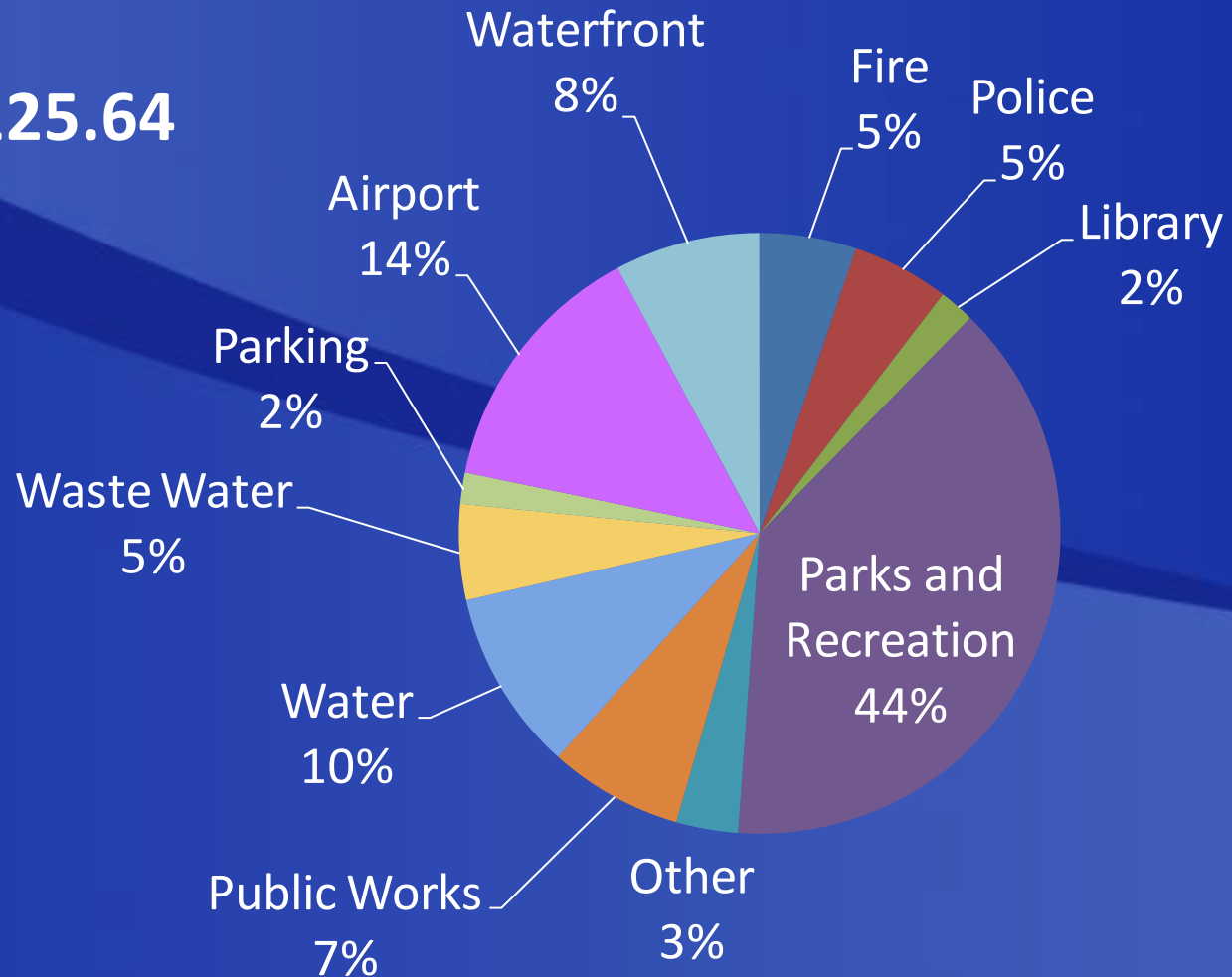
# Natural Gas

Natural gas usage in 2013 increased slightly. Several facilities have antiquated heating systems that continue to increase in natural gas consumption as they age. The Energy Team is seeking out more opportunities to reduce natural gas demand at these facilities.

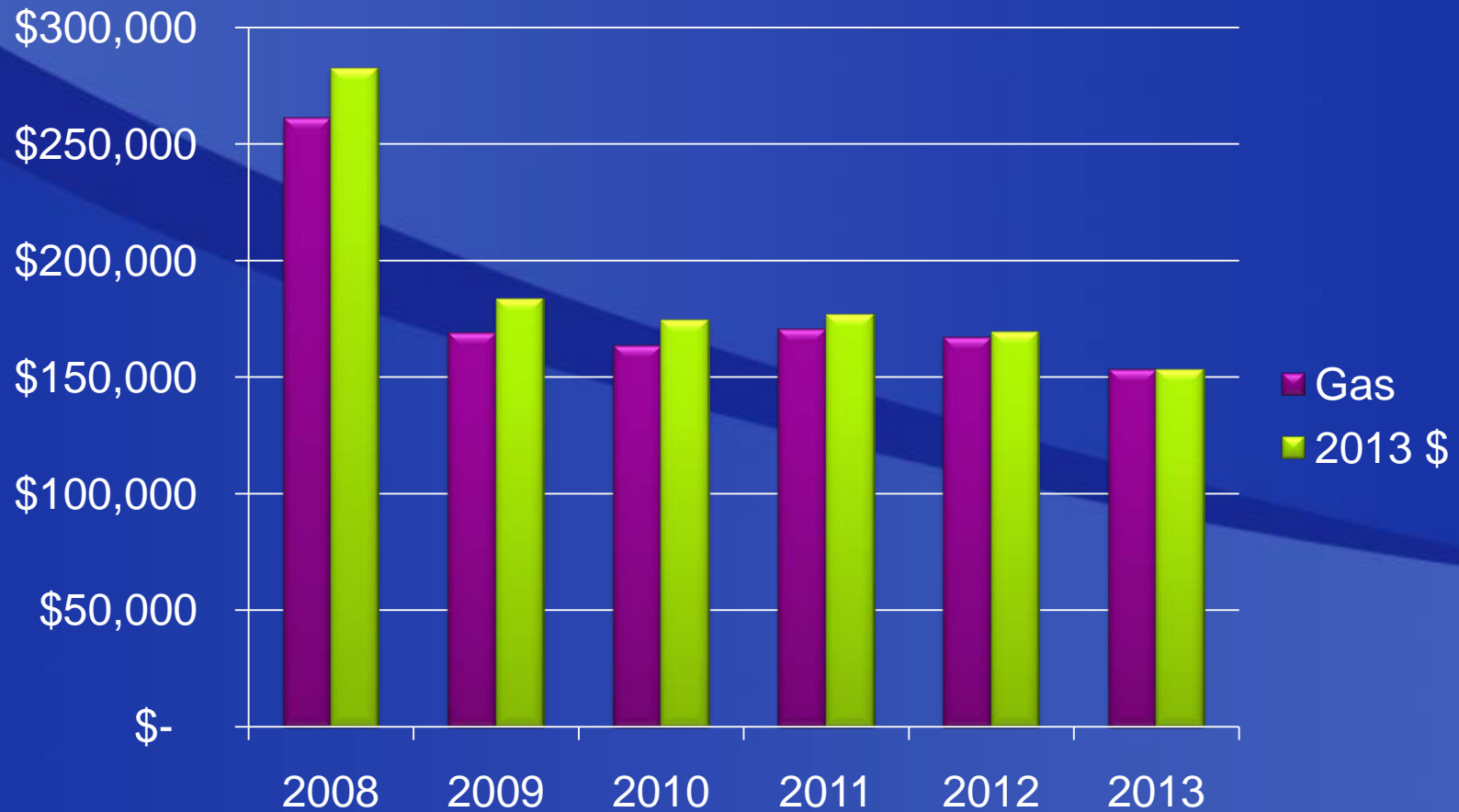
Pool heating at the Los Baños del Mar pool remains the largest consumer of natural gas for the City. City staff replaced the pool boilers with high efficiency condensing boilers in 2012 and we continue to see successful reduction in natural gas consumption as a result of that project (further reduced by 7% in 2013!).

# FY 2013 Natural Gas Expenditures

**Total \$153,125.64**



# Gas Cost by Year





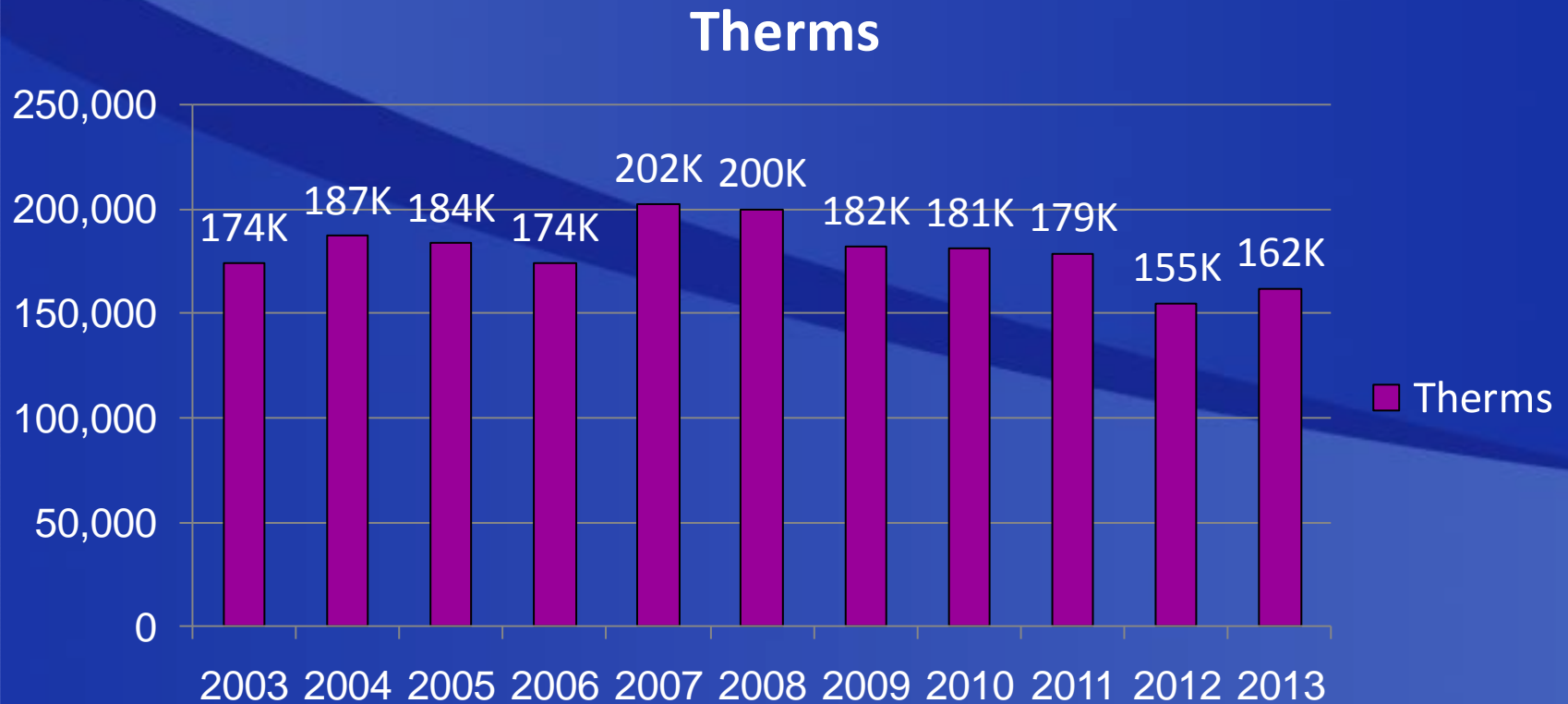


# Natural Gas Usage

2013 experienced a small increase in natural gas usage, largely due to outdated heating equipment at the Police Department and Cabrillo Arts Pavilion.

The following slide shows the amount of natural gas purchased by the City annually since 2003

# Natural Gas Use by Year



# Largest Natural Gas Users

Location	2013 Annual Therms	% Change From 2012
Los Baños Del Mar Pool	33,989	↓ 7%
Airport	17,814	↓ 2%
625 Laguna (Public Works)	13,218	↓ 7%
Police Department	12,928	↑ 43%
Cabrillo Arts Pavilion	12,376	↑ 40%

This chart shows the Southern California Gas Company accounts with the highest gas usage for City-owned facilities. Both the Police Department Building and the Cabrillo Arts Pavilion have outdated and inefficient boilers used for heating, which accounts for the increasing natural gas demand.

# Renewable Energy







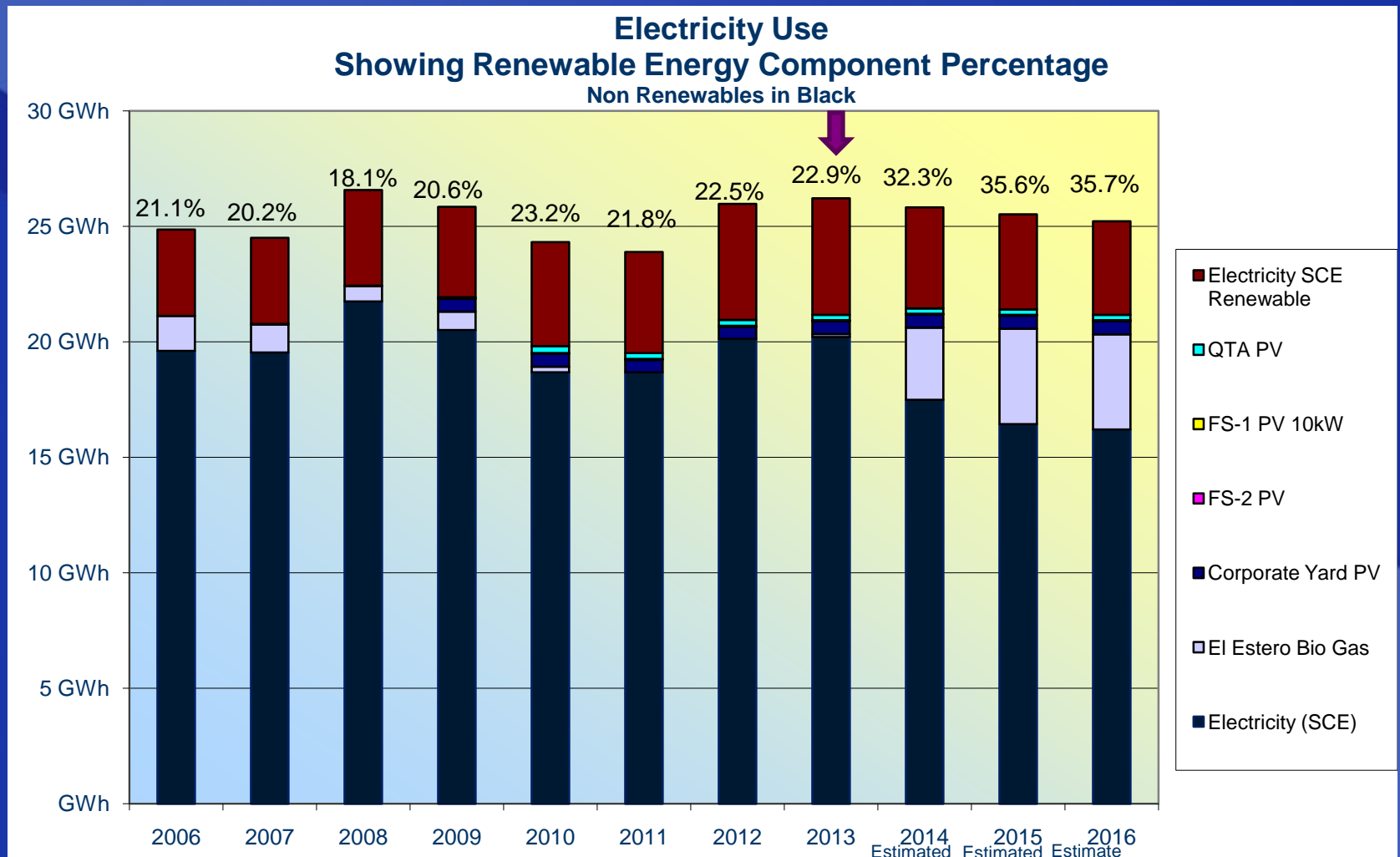
# Renewable Energy

Renewable energy represents a substantial and growing part of the City's electricity supply. Currently, renewable energy sources make up 23% of all the City's electricity use.

Renewable energy sources include photovoltaic generation and Southern California Edison renewable sources and now includes renewable methane cogeneration.

The following slide shows the components of the renewable energy used at the City.

# Renewable Percentage of Electricity City Operations





# Photovoltaic Generation

The City has two large photovoltaic (PV) generation facilities.

- A 300 kW plant, located in the Public Works Corporate Yard was installed in December 2008. This array supplied 99% of the electricity used for the Public Works facility in 2013.
- A 190 kW plant, located at the Airport's Quick Turn Around rental car maintenance facility. It provided more than 88% of the facility's electrical needs.

A third, large PV installation is currently being considered for the Airport's long term parking lot.

# Solar Photovoltaic Projects

This table shows the annual solar generation and system size for all City solar photovoltaic generation projects. These systems provide a total annual generation of 850,000 kWh. This is enough energy to power 150 local area homes.

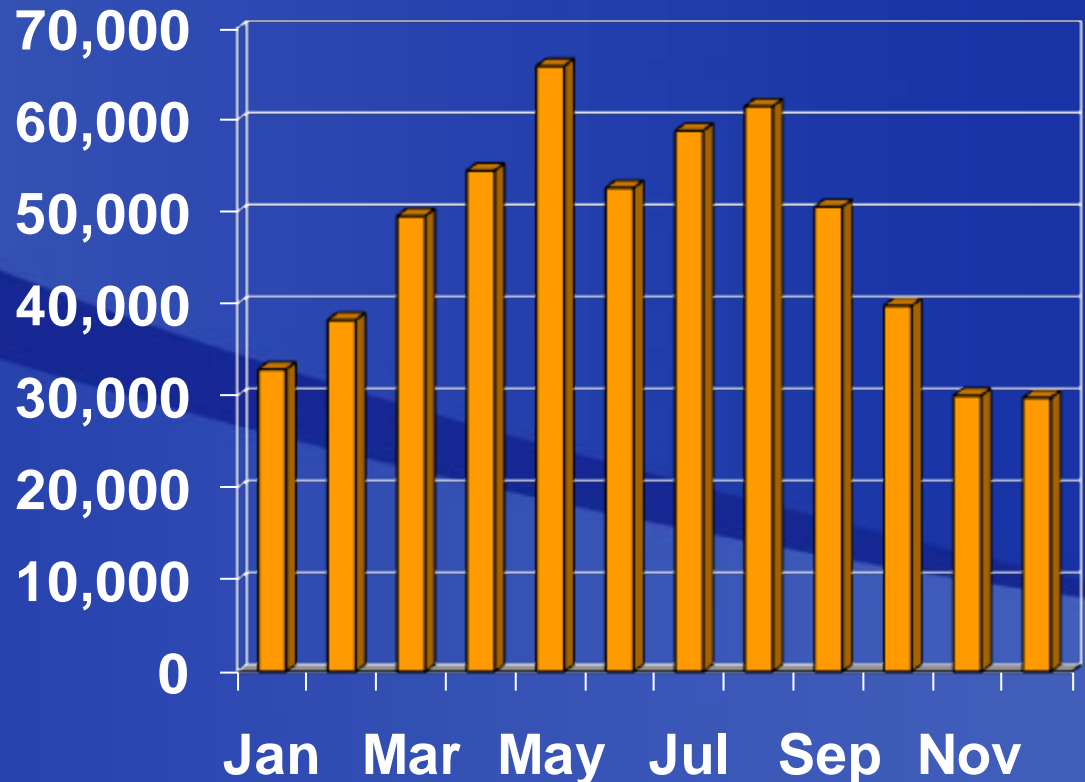
Project	Year Installed	kW (size)	Annual kWh
PW Corporate Yard PV	2008	302	564,124
Airport QTA PV	2010	190	233,819
Fire Station 2 PV	2007	15	28,000
Fire Station 1 PV	2009	10.2	24,000

# 2013 Corporate Yard Power Production

This slide shows a monthly breakdown of electricity generation for the Corporate Yard Solar Array for 2013

564,124 kWh Total

■ kWh



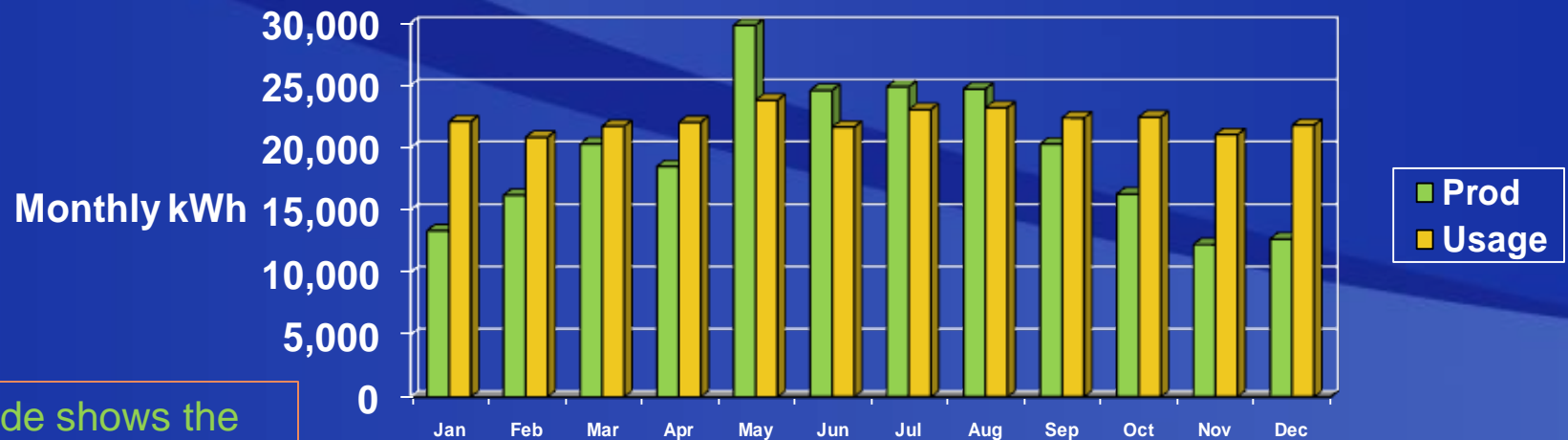
The Corporate Yard PV system is exceeding expectations for total generation. The system provided 99% of the electrical needs for the Garden Street and Laguna Street Complexes



# Airport QTA PV System



## 2013 PV Production and Electrical Usage



This slide shows the monthly breakdown of electricity generation and usage at the QTA facility for 2013

2013 Total Production – 233,819 kWh

2013 Total Usage – 266,070 kWh

Net Utility Supplied Electricity 2013 – 32,251 kWh

# 2013 Renewable Electricity Totals

Southern California Edison delivers about 20% renewable energy in their power mix.

The combination of SCE and City renewable generation sources provide the City:

- 23% Renewable Electricity

We anticipate an increase in this percentage in 2014 due to the Cogen plant coming online

# FOG Station

The City's Fats, Oils and Grease (FOG) receiving station and our engine cogeneration facility at the El Estero Wastewater Treatment Plant both officially launched in 2013.

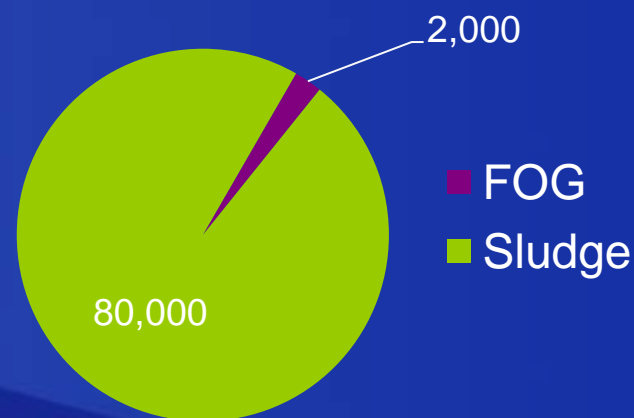
The FOG project allows El Estero to receive brown grease from local restaurant grease interceptors and inject that material into the waste treatment process, generating more methane to be used by the cogeneration facility to generate electricity and heat for plant operations.



# FOG Station: The First Year

- ◆ Total FOG materials received: 465,997 gallons
- ◆ 93 Truck trips to Kern County avoided (roughly 100MT of CO2e avoided)
- ◆ Performing as expected, with no negative effects on plant operations so the facility is ready to accept more FOG material (up to 5,000 gallons daily)

**Digester Feedstock (gal)**



\*FOG is currently a very small percentage of what is fed to the digesters. We anticipate more significant impacts as the amount of FOG increases.



# FOG: The First Year

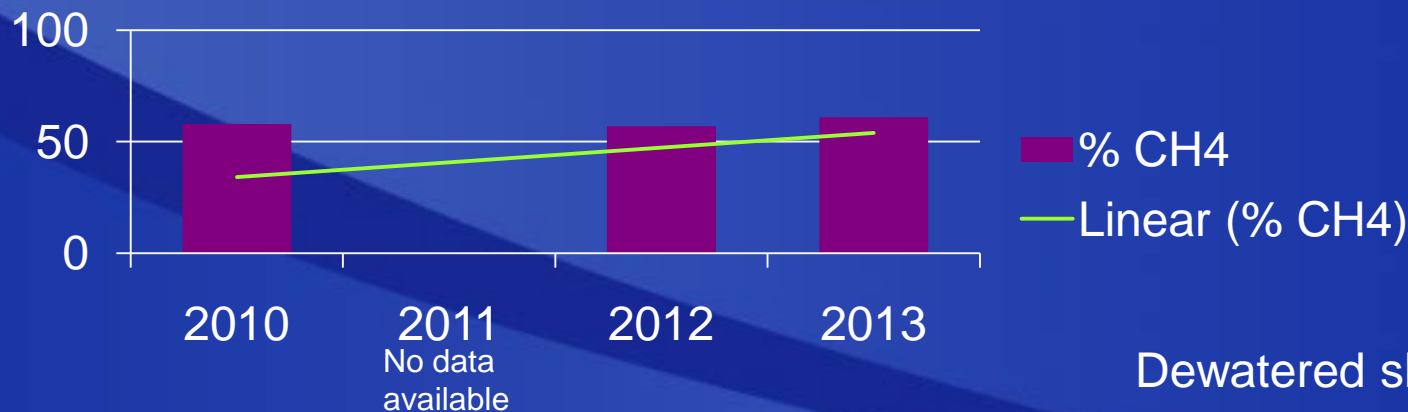
Though there has only been one year of data collected, there does appear to be a slight increase in Methane gas ( $\text{CH}_4$ ) produced and a reduction in the amount of dewatered solids needing to be disposed of by the Plant.

The following slide demonstrates the increase of methane content and the decrease of dewatered sludge over time.



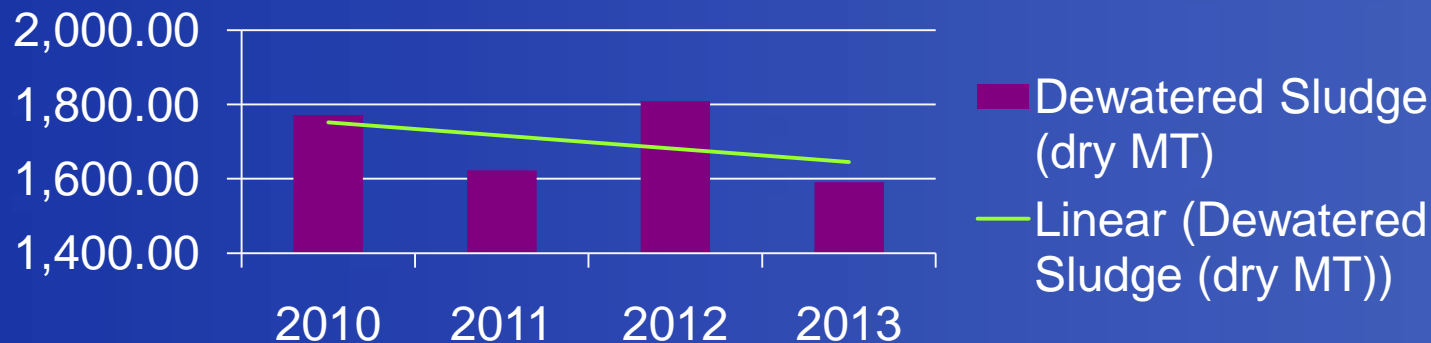
# FOG: The First Year

## % Methane in the Biogas



Dewatered sludge

## Dewatered Sludge (dry MT)



# Energy Conservation

The Energy Team is applying new technologies, such as a comprehensive Enterprise Energy Management Information System and building automation systems to find new opportunities for reducing energy use.

When the Energy Team designs energy conservation projects, we try to maximize:

- Energy Savings
- Operational Savings
- Maintenance Savings
- Deferred Maintenance Reduction –targeting building systems that need to be replaced due to age

# Success Story: Direct Install

Direct Install, an SCE-offered program, sends contractors to identify ways to save electricity for eligible measures and provides the products and labor to implement the upgrades.

Measures installed at City Facilities:

- High efficiency T-8s Fluorescent lighting
- LED Lighting
- Window Film (Tint)

Buildings that benefited from Direct Install in 2013:

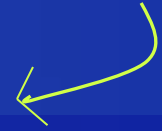
- City Hall
- Central Library
- Corporate Yard
- 630 Garden St.
- Cabrillo Arts Pavilion
- Westside Center
- Police Department
- Westside Center
- Cater
- City Attorney's Office
- Carrillo Rec Center
- All 8 Fire Stations
- Los Baños Pool

# Direct Install 2013

- ◆ Value of lighting retrofits: \$146,368
- ◆ kWh savings: 216,620
- ◆ kW savings: 51.96
- ◆ Saves an estimated \$30,000 in electrical costs per year!



Before



After





# Energy Team Savings

The efforts of the Energy Team have resulted in significant cost savings for the City. Since the Team became active in 2008, we have achieved an ongoing annual savings of \$465,000 from energy conservation and tariff changes.

The Team also applies for and receives grants and rebates. The following page shows the one-time grant and rebate funding and cumulative annual savings for the City's energy program



# Energy Team Savings

## One Time Savings 2013

- ◆ Rebates – \$ 35,891
- ◆ Grants - \$ 62,520
- ◆ Direct Install Funding - \$146,368

## Ongoing Annual Savings\*

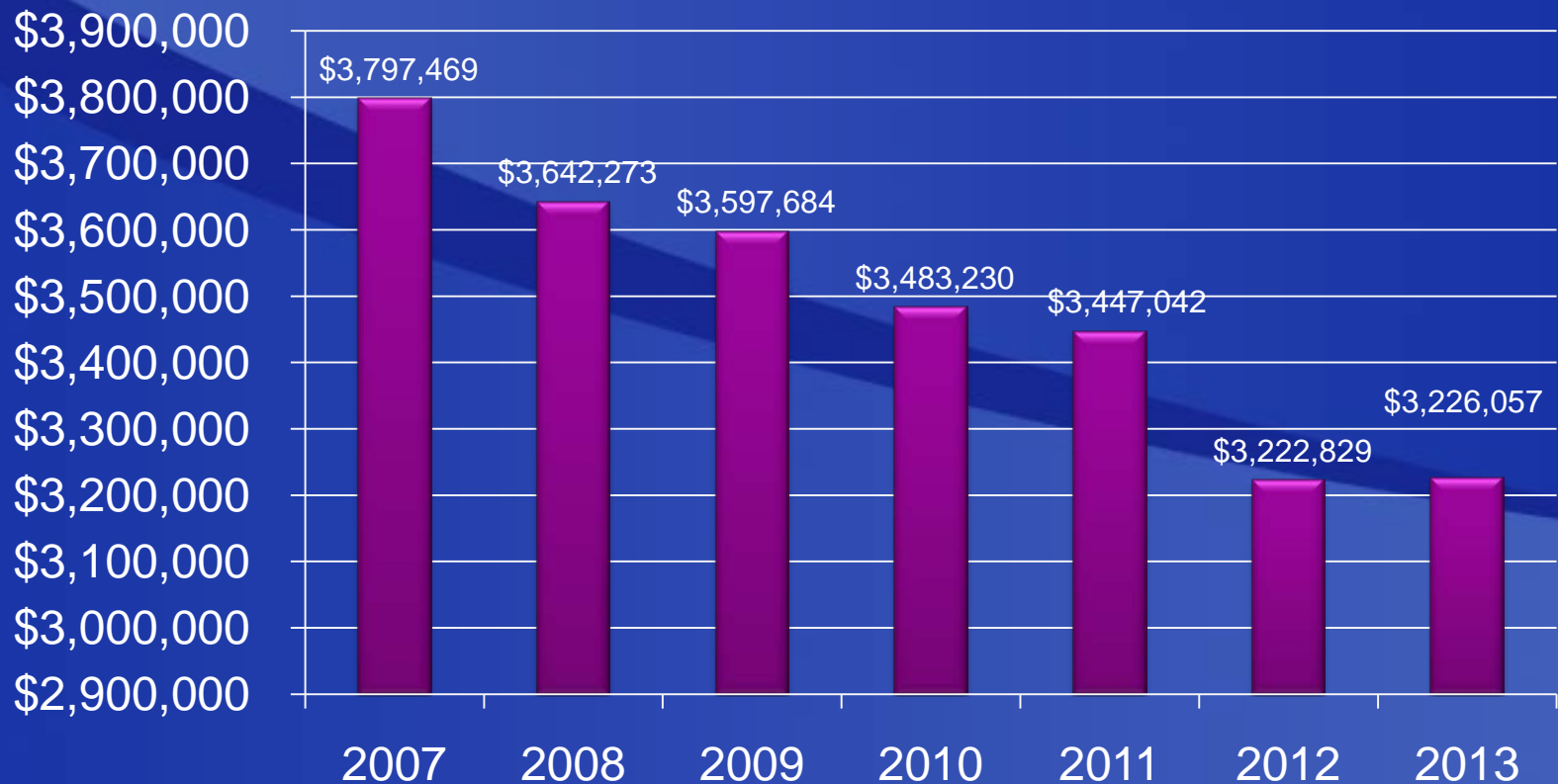
- ◆ Annual Conservation Savings – \$ 340,000
- ◆ Annual Electrical Rate Savings – \$ 125,000

**Total- \$ 465,000**

\* From actions taken FY 2008 through FY 2013

# Purchased Electricity Less Airport Terminal and Cater Ozone Increases

2013 \$



# Purchased Electricity 2013 Savings 2007 Base Year



\*Adjusted for increases in cost for Airport Terminal and Cater Ozone addition usage

# Future Energy Projects



- ◆ El Estero Influent Pumps Upgrade
- ◆ Micro Hydro
- ◆ Police Department HVAC Replacement
- ◆ El Estero Outdoor Lighting Project
- ◆ Energy Efficiency Revolving Fund Study
- ◆ Los Banos Pool lighting
- ◆ Granada Garage CO sensor upgrade
- ◆ Airport Solar (about 800 kW)

# GHG Emissions





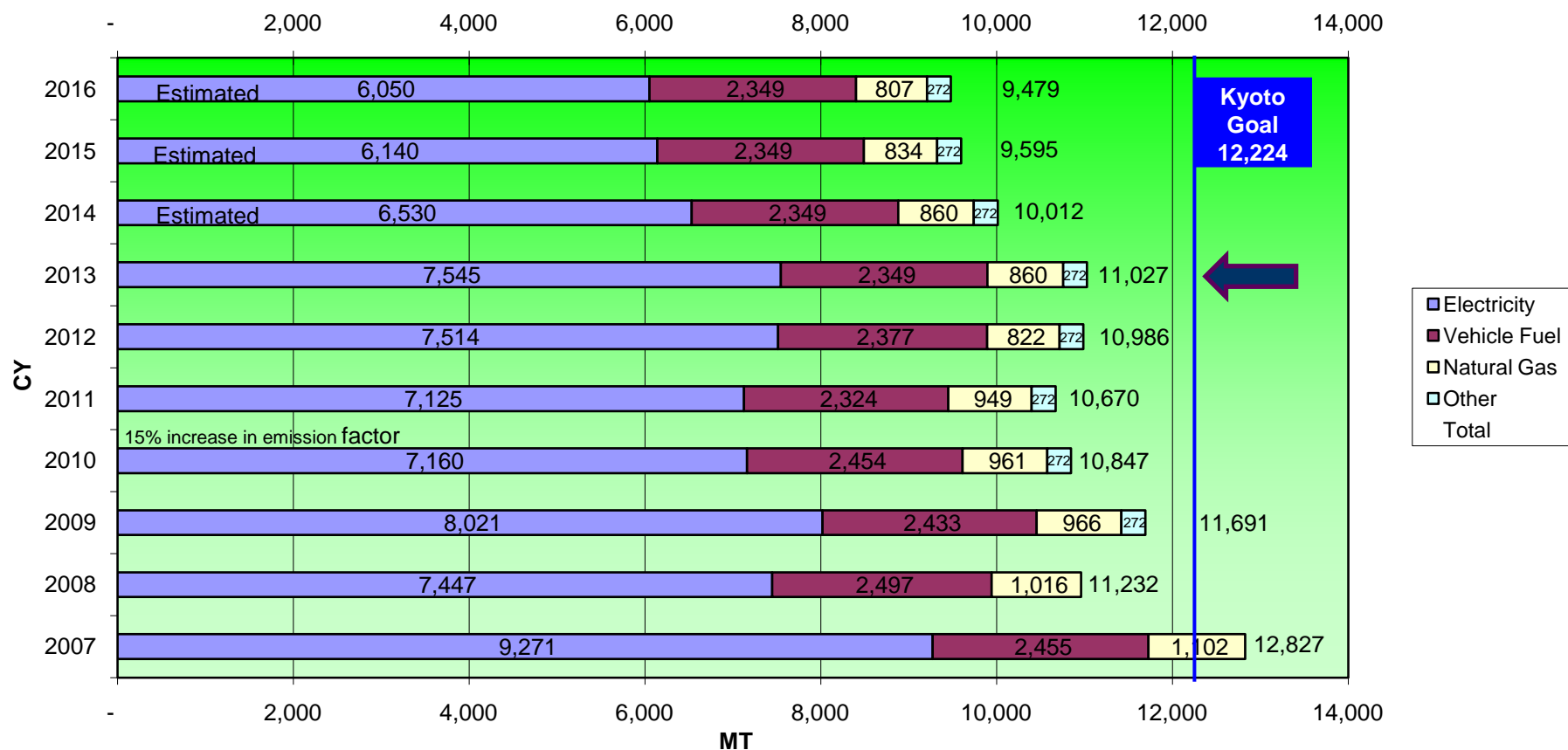
# Greenhouse Gas Emissions

The City's greenhouse gas emissions for operations from all sources, including transportation, energy use and other sources; are decreasing due to conservation and efficiency. Calendar year 2013's emissions in Carbon Dioxide Equivalents (CO<sub>2</sub>e) is 11,027 metric tons, well below our Kyoto target of 12,224 metric tons.

The following chart shows actual and projected CO<sub>2</sub>e since 2007.

# CO<sub>2</sub>e Emissions from City Operations

**CO<sub>2</sub>e Emissions by Type**  
as reported to the CCAR and CAR (2014, 2015, 2016 Estimated)



# Acknowledgements

The Energy Team's success this year is the result of the hard work of City staff, and the support of the City Council and the Community. Our aim is to serve as an example by implementing projects that save energy and money, using strategies that others can duplicate.

Energy conservation is a great opportunity to save money and preserve natural resources.

Thanks to you for supporting our efforts to conserve energy and save money.

# Special Thanks To:

- ◆ Jeff McKee
- ◆ Victor Garza
- ◆ Dion Tait
- ◆ Karl Treiberg
- ◆ Amanda Flesse
- ◆ Rebecca Bjork
- ◆ Joe Gonzales
- ◆ Herman Escalante
- ◆ Kate Whan
- ◆ David Lewis
- ◆ Todd Heldoorn
- ◆ Nina Johnson
- ◆ Andrew Rhodes
- ◆ Chris Toth
- ◆ Kelly Greeley
- ◆ Victor Ayala
- ◆ Alelia Parenteau
- ◆ And many more!